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ABSTRACT

A remedial program was developed at Nashville State Technical Institute to provide individualized instruction in mathematics, English, and reading. Students scoring less than a composite 50 percent on the five sections of a developed diagnostic reading test were assigned to the remedial reading program. The IBM Model 30 Computer was used to assign materials, to keep records, and to do some nonteaching tasks. Materials used for comprehension practice were articles gathered from magazines and journals relating to 19 interest categories. A computer code number indicating reading level, interest, and location in the laboratory was assigned to each article. Short comprehension tests were also developed for each article. Every 2 weeks, the computer assigned reading materials to students on matched interests, recorded materials assigned to each student, and updated student progress during each printout period. Each student was also given a private conference every 2 weeks, and the information was coded and supplied to the computer for evaluation. Vocabulary enrichment came as a by-product of the comprehension work. Phonics instruction was done on a diagnosis-prescription basis with the diagnostic test subscales analyzed through the use of computer printed profile sheet. Test results and grade point averages have shown the program to be successful. References are included. (AW)

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Use of the Computer in Individualizing Remediation at Nashville State Technical Institute

by

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Nashville State Technical Institute is a coeducational two year college level institution offering Associate Degree programs in five major fields of study. It seeks to prepare students to become technicians in an academic environment knowledgeable of the world of work into which its students will graduate. The technical institute is a recent addition to the array of post high school training programs. It was created for the purpose of "training engineering technicians for industry and preparing the student to earn a living as a technician or technical worker in the field of production, distribution, or service."[1]

Nashville State Technical Institute draws from the upper middle to the low percentiles of high school graduates in Tennessee. The Institute has an "open door policy" meaning that any person who holds a high school diploma or a GED Certificate must be admitted so long as there is physical space available. The range of reading ability in the junior college (and technical institutes) is often ten or more grade levels, from grade four or five for some vocational and

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1 Faculties and Administration of Tennessee State Technical Institutes and the Staff of the Tennessee Division of Vocational-Technical Education, "Role and Scope of the State Technical Institutes", as quoted from House Bill No. 633 by Tennessee House of Representatives, page B-1.

technical students to grade fifteen or sixteen for a few bright academic students.[2] Approximately fifty percent of the student population at Nashville State Technical Institute require some additional training in reading to bring them to the level where they not only can read and understand their daily assignments, but also can become proficient in reading and understanding the highly specialized material in the technology of their choice. Due to the variations in academic preparedness of our students, a remedial program had to be developed to provide individualized instruction in the fields of mathematics and English as well as reading. The primary objectives of the program are the same for the three basic areas.

(1) To develop systematic micro-diagnostic techniques for detecting skill inadequacies of entering technical students.

(2) To develop individualized instructional materials which will provide students with the opportunity to effectively remove skill deficiencies.

(3) To increase the level and rate of achievement.

(4) To reduce the attrition rate, and

(5) To develop a computer-based environment in which these results can be implemented.[3]

In developing a remedial reading program, the following points had to be considered and included to make the program function.

(1) A diagnostic reading test would have to be developed which would indicate an individual's proficiency in vocabulary, syllabication, long and short vowels and difficult consonant combinations. The instrument should also diagnose technical reading comprehension in the areas of organization of material, contextual vocabulary, information, and main idea.

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[2] Delton D. Goodwin, "Measurement and Evaluation in Junior College Reading Programs", Junior College Research Review, Vol. VI, No. 2, Pages 1-2, October 1971.

[3] Daniel J. Reiber, "Exemplary Project Report", (Unpublished Report), Nashville State Technical Institute, 1970-71, Page 2.

(2) A series of comprehension programs would be required which would be multi-level, adult, current and leading directly to the student's vocational and avocational goals.

(3) Phonics instruction would be included only in the areas of vowel sounds, consonant sounds and syllabication.

(4) General vocabulary enrichment and specific vocabulary reinforcement would be provided in each student's major technology.

(5) Study skills and techniques would have to be taught on an individual basis.

(6) Reading oriented tutorial assistance would have to be furnished as a supplement to lecture classes in other courses. Tutoring would be provided at the request of the student or any of his instructors.

(7) Personal attention would be given to each student in the program.

In order to meet these goals, additional help was needed to assign materials, to keep records, and to relieve the personnel in the program of the time consuming burden of non-teaching tasks. The IBM 360 Model 30 Computer located on campus was utilized to do these tasks.

The program's first consideration was a diagnostic test. No suitable diagnostic reading test was found to meet the needs of the technical students. Therefore, one had to be developed. It was composed of five parts - vocabulary, syllabication, vowel sounds, difficult consonants and their combinations, and comprehension. The comprehension section of the test attempts to evaluate the student's technical reading comprehension, his organizational retention and his analysis of words in context. This section is weighted more than the others. After extensive field testing on comparable groups of students and subsequent item analysis of test questions and answers, test items were improved and the test was refined. It was determined that any student scoring less than a composite score of 50% on the 5 sections of the test would be assigned to remedial reading. Because the program was of experimental nature, the Stanford High School Achievement Test was chosen to administer to those students assigned to reading. Later, the WPJ Diagnostic was shown to have a correlation coefficient with the Stanford of .64.

The second objective was developing or securing comprehension materials. Textbooks that would be interesting to some students would be dull to others. Texts that stressed understanding of technical material were practically non-existent. Paperback books, magazine articles, and professional journals offered an interesting source of reading materials. These offered the additional bonus of introducing a variety of new words whereby a student could enrich his vocabulary. The difficulty of using this kind of material was obvious. If a student had coasted through high school not reading, how could one be sure he was understanding his reading assignments? For this reason, short comprehension tests were developed on each article used. With the exception of those thought to be of limited interest, the exercises and tests were laminated and filed. To supplement the magazines and technical journals, commercial materials such as the SRA Laboratory Kits were added, and certain college level reading improvement workbooks were torn apart and filed.

The objective was to make assignments that would be of interest to the student. If he didn't like to read anyway, it would be difficult to motivate him to read assignments of little or no interest to him. Rather, his distaste for reading would sharpen to the degree of disgust. As an attempt to provide something for everyone, nineteen interest categories were determined. Five of these areas were the technologies offered at Nashville State Technical Institute. The remaining areas covered a broad spectrum of male* avocational interest. After a reasonable number of articles in each interest category were gathered, the Dale Chall Readability formula was used to determine the level of difficulty of the articles. The formula was applied to representative samples rather than to all articles. Moreover, a computer code number was assigned to each article. This number indicated reading level, interest, and the location of each article in the laboratory. Finally, an inventory of interest had to be developed to indicate the interest areas of each student. Dr. Jim Hogge of George Peabody College for Teachers

* Only six girls have been through the program to date.

wrote an experimental inventory. This instrument indicates the reading areas which each student would find most enjoyable. After the interest inventory is given, the results are key punched, the computer interprets the raw data, and then assigns each student five interest codes. One of these is the student's major field. The student will be assigned material only from the five interest codes. The codes of all the comprehension materials available are recorded on a disk pack in the computer file. The interest codes and reading level of each student is given to the computer. The machine matches student to materials on a two week assignment sheet which is printed by computer. At the same time, the computer keeps a record of all materials each student has been assigned to avoid any student being assigned the same article twice. During each printout period the computer file can be updated with new information concerning student progress. As the student progresses, the assignments are drawn automatically from more difficult reading materials.

Evaluation of student performance in comprehension is accomplished at the end of each printout period. Because of the time saved through the use of the computer, each student is given a private conference every two weeks. These conferences usually last from ten minutes to thirty minutes. All of the student's work which is graded and contained in his personal file is reviewed with him. The grades on all his assignments are averaged to a percentage figure called percentage of achievement which is color coded on a graph in each student's file. This objective evaluation, along with various subjective factors, determines whether the student should move to a more difficult level or remain in his present level.

Reasonable care is exercised to assure that all students are shown progress, no matter how small. Information gained during the conference periods is coded and supplied to the computer center before new printouts are run. New articles are prepared and put on the computer file every quarter. Old, out-dated materials are discarded.

In the Nashville State Technical Institute reading program, vocabulary enrichment comes as a by-product of the comprehension work. In addition to this, vocabulary exercises have

been developed that teach basic suffixes, prefixes, and root words. In addition to these miscellaneous vocabulary exercises, technical vocabulary reinforcement exercises have been and are being developed. These are computer managed or assigned instructional materials developed by the reading center in cooperation with the instructors of each particular technology. In data processing, for example, many new words were introduced during the introductory quarter that the programmer would need to know for his entire career in data processing. These words were presented in a program using the 2260 Visual Display Unit. Vocabulary exercises are displayed on the screen according to the needs of the student. Branching techniques enable the computer to present wrong answer responses. Thus, additional drill is given to students who need it. The 2260 display terminals are not located in the reading laboratory. Rather, they are in a centralized location where they are also used by the math and English departments.

Phonics instruction in the program is done on a diagnosis-prescription basis. The diagnostic test subscales are analyzed using a computer printed profile sheet. The incorrect responses indicate which particular lessons in the institute-developed series the individual should be assigned. Later, after he is in a technical laboratory situation, he is given an intensified phonics test. Using the information from this instrument, the computer profile is either verified or modified to further diagnose the student's phonetic deficiencies. For example, if a student is unable to divide a word into syllables between double consonants, he is given the first assignment on that particular rule. There are up to four more lessons teaching the same rule that the student may work if he needs them. After he has mastered a specific skill, he goes to the next one in the series until he has mastered all the areas in which he was found to be deficient.

All through the quarter that the student is in the reading program, he is encouraged to skim written material before reading it for information. As he skims he is encouraged to

"second guess" the author to determine the subject, purpose, tone, etc. of the article. Also, he is encouraged to sound out the unfamiliar technical terms that he encounters. Each instructor in the reading program is available at least part of every day to tutor the students in lecture oriented subjects. This program's apparent success is due primarily to instructors being attuned to the needs of the individual student.

The program has been successful and has shown to be an effective means of remediating student deficiencies. At the end of the Spring Quarter, 65% of the students who completed the remedial reading course were still enrolled at the institute. Twenty five of those students who completed Reading 10 have been on the Director's Honor Roll, meaning that they have made a 3.0 grade point average or above on a 4 point system.

Students in the reading program the Fall Quarter of 1970 showed significant gains in the areas of syllabication, vowel sounds, vocabulary and technical comprehension. The probability that these gains were due to chance occurrences was less than .01. The Stanford High School Battery reading subtest was used to verify results Fall Quarter '70 and Winter Quarter '71. These showed a 5.95 raw point average increase per student. The preliminary results of the program are more effectively shown by examining the post test percentage gains given below:

Test Area	N	X_1	X_2	% Gain	P
Vocabulary	66	13.4	14.6	9.0	$< .01$
Syllabication	67	12.0	13.4	11.7	$< .01$
Consonant Sounds	59	4.6	4.6	0.0	.87
Vowels	66	8.3	10.4	25.3	$< .01$
Tech. Comprehension	67	20.6	24.5	18.9	$< .01$

N = Number of students with pre test and post test scores

X_1 = Pretest mean; X_2 = post test mean

% Gain (X_2-X_1) expressed as a percentage of X_1

P = Probability of chance occurrence

If a remedial program can alter the failure patterns of the students and allow them to develop the motivation and skills needed to become technicians, then it may safely be deemed successful. This kind of a program benefits the student, the institute and society through the development of the most basic of natural resources, the human intelligence.

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